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ABSTRACT

Designed to improve the reading skills of electronic students, these instructional materials include a series of reading passages taken from material actually used in an electronics course and a set of exercises dealing with reading for both main ideas and details. The exercises presented employ a variety of formats including identifying main ideas of paragraphs, answering technical questions based on reading passages, analyzing the structure of individual paragraphs, paraphrasing technical material, answering multiple choice and fill-in-the-blank-type questions on passage content, assessing the relative importance of facts presented in a given technical passage, and differentiating between general and detailed information. (MN)

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READING FOR MAIN IDEAS AND DETAILS IN ELECTRONICS

by

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INTRODUCTION

Scientific writing, such as you find in the field of electronics, is usually jammed with facts and information and is significantly different than the writing style found in such subjects as history and psychology. In order to truly master the materials you will be asked to read in electronics you will have to become skilled at identifying the main idea within a written passage as well as seeing how all of the supporting information and details relate to it.

In reading scientific writing it is important to understand that main ideas are not likely to be written as the topic sentence, such as you might find in a history or psychology text. A topic sentence is normally the first sentence in a paragraph which gives a general statement about the topic contained in the rest of the sentences. The main idea in scientific writing is often contained in a number of sentences which have to be combined in order to clearly understand it.

On the following pages you will be asked to read a number of passages taken from the course material you will be using this semester. After reading each passage you will be asked to identify the main idea. In some of the exercises you will be given a number of possible answers to choose from, and in others you will be asked to write the main idea in your own words. If you have difficulty with this material and don't understand even after you have checked the key and read the explanations please discuss your answers with one of the instructors.

Some paragraphs are very short, consisting of just a few sentences. Very often the main idea will be the first sentence in such a paragraph. Consider the following, taken from the unit on hand tools:

> Screwdrivers are made in many sizes from the very small to the very large. The size and type of screwdriver must be chosen to match the screw that is being driven.

What is the main idea of this paragraph? If you said that the main idea is

"Screwdrivers are made in many sizes"

you would be correct. The rest of the information in this paragraph is detail which tell more about the main idea. These details include the facts that these sizes range from very small to very large and that the type of screwdriver you use must be chosen to match or fit the screw that is being driven.

Read the following paragraph:

> The phillips screwdriver has four flutes, shaped to fit the recessed slot in the screw. The size of the screwdriver must match the size of the slot in the screw. That is the diameter of the slots in the head of the screw should just match the flutes of the screwdriver.

If you said that the main idea of this paragraph is

> "The diameter of the slots in the head of the screw should just match the flutes of the screwdriver"

you would not be correct. The reason that this is <u>not</u> the main idea is that the subject that this paragraph is mainly about phillips screwdrivers and how they work, and this sentence contains information which adds details to what the screwdriver

has that makes it different from regular screwdrivers, namely flutes. The main idea of this paragraph is

> "The phillips screwdriver has four flutes,
> shaped to fit the recessed slot in the screw."

Do you see how the rest of the paragraph adds details and fills in additional information about these kinds of screwdrivers? There are two additional facts in that paragraph which help explain how it works. One fact is that the size of the screwdriver must match the size of the slot in the head of the screw. Try and picture using a screwdriver which is either too large or too small for a screw you are trying to tighten. Probably you have had such an experience more than once, and no doubt you realize that it really isn't possible to use the wrong size screwdriver very well. The second fact is that the diameter of the slots in the head of the screw should just match the flutes of the screwdriver. It is hoped that your vocabulary includes the word 'diameter', which is another way of saying across. In other words this detail says that the diameter, or width, of the head of the screw should just match the flutes of the screwdriver. At this point you might be saying, ok, but what does the word flutes mean? Well, as you probably know a screwdriver has a single blade which fits into the slot on the head of a screw. A phillips screwdriver, as you just read above, has four flutes which fit into the screw. So, if a screwdriver has a single blade what does a phillips screwdriver look like from the end? It looks something like this: + And the head of a phillips screw looks like this: ⊕

OK, get the idea on main ideas? Remember that they are what a paragraph is mainly about. There will be a lot of other information in a paragraph as well, but these details should not be confused for the main idea.

THE BALL-PEEN HAMMER

The machinist or tool-makers hammer has a round-shaped head on the opposite end of a conventional-shaped head. This tool is commonly called a ball-peen hammer. The flat surface of the ball-peen hammer is used as a conventional hammer and the rounded surface is used for peening metal; for example, peening a rivet. As with all hammers the handle of the ball-peen hammer should be held near the end. The ball-peen hammer should not be used to drive nails.

EXERCISE

Is the following statement the main idea of the paragraph?

> The ball-peen hammer should not be used to drive nails?

I hope you didn't say that this was the main idea, because if you did you have mistaken a detail, which is important, for the broader meaning of the paragraph. That is to say this detail is too small, by itself, to be considered the main idea. On the other hand it is possible to make a statement which is too broad. Look at the following:

> There are many kinds of hammers.

That can't be the main idea of the paragraph, because this particular one is only dealing with a single kind of hammer. Therefore the statement is too broad, or general, to be thought of as the main idea.

Actually the main idea in this paragraph is contained in the first two sentences. Both sentences have to be used, because there are two names for the hammer and a description of it in the first sentence, but the second sentence says that there is a more common name than the first two. So, you would have to combine these two sentences and put them into your own words in order to come up with a good main idea for the

paragraph. Perhaps it should read like this:

> The ball-peen hammer, which is also known as the machinist or tool-makers hammer, has a round-shaped head on the opposite end of a conventional-shaped head.

All the rest of the information in that paragraph adds details to this statement.

In order to really understand a paragraph you also should be able to visualize, or see in your mind, what the author is talking about. Can you picture a ball-peen hammer? It has a conventional (or regular) shaped head on one end, and a round shaped head on the other. Obviously you cannot use this kind of hammer for pulling nails. Can you see it?

Safe operating procedures are each person's responsibility and extend into many areas at home, on the highway, in the shop, and in the laboratory. In order to observe safety precautions in any particular place and especially with electricity, therefore, a person must know what the hazards are. Otherwise he easily becomes familiar as he works, and all too often, familiarity with the equipment leads to carelessness - with fatal results. So it is absolutely necessary to point out certain principles of electrical shock so that the need for and the nature of, safety precautions may be thoroughly appreciated.

EXERCISES

If one is so familiar with an electrical procedure that he allows himself to become careless it can have fatal results.

a. Is that statement too specific to be the main idea of this passage?
b. Is it a true statement?
c. Is the statement relevant to the main idea of the passage?

a. Yes, the statement is too specific to be the main idea of the passage. This particular passage does not just deal with the fact that an electrical shock can kill, but also points out the need for a general understanding of safety precautions when working with electricity. Thus the statement is too specific to be considered the main idea, because it failed to mention the need for an understanding of safety precautions when working around electricity.
b. It is true that if a person is very familiar with an electrical procedure he might become careless and suffer a fatal shock. However, by itself this is not the main idea of the the paragraph even though it is an accurate fact.
c. This statement is relevant to the main idea of the passage, but is not complete enough to stand by itself as the main idea.

If the statement following the passage on the last page isn't the main idea, then what would be? In this particular case it will be necessary to take ideas from several of the sentences and put them together in slightly different wording to come up with the main idea. This passage talks about 'safe operating procedures' and 'safety precautions' in a variety of settings, including the home, highway, shop, and in the laboratory. The passage is not a general discussion of all kinds of safety precautions, however, because it is dealing specifically with electricity and does not touch upon other areas of safety such as the condition of machinery, noise, chemical spills and so on. So, perhaps one way to put the main idea of this passage down would be something like this:

> In order to fully appreciate the need for safety precautions around electricity it is necessary to point out the basic principles of electrical shock.

The pipe wrench, or stillson wrench, gives a gripping action when used on a pipe or other cylindrical surface. The construction of this wrench allows immediate release of the gripping action when pressure is removed from the handle. This action allows a new grip to be obtained readily. Pipe wrenches come in many sizes so that the correct size can be selected for the job on which it is to be used.

Ouch! All of a sudden this is starting to get a little complicated. Each sentence in this paragraph contains part of the main idea, but you can't say that the main idea is all of the sentences. What to do? Consider why none of the following statements are 'good enough' to be the main idea.

1. There are many kinds of pipe wrenches.
2. When you remove pressure from the handle of a pipe wrench it immediately releases it's gripping action.
3. You should always select the right sized wrench for the job on which it is to be used.
4. A new grip on a pipe may be obtained readily because of the way in which the pipe wrench is constructed.

1. There are many kinds of pipe wrenches.

This is not even factual or true, according to the paragraph you just read. The paragraph says that there are many sizes of pipe wrenches but doesn't say anything about kinds.

2. When you remove pressure from the handle of a pipe wrench it immediately releases it's gripping aetion.

This sentence contains a very important fact you need to understand to fully master the use of the pipe wrench. However the main idea of this paragraph is not just about the gripping action of the pipe wrench.

3. You should always select the right sized wrench for the job on which it is to be used.

This is also important information, although if we have to look at sentences or facts and say that some are more important than others then perhaps we could say that this particular bit of information is probably not as important as what you read in sentence #2.

4. A new grip on a pipe may be obtained readily because of the way in which the pipe wrench is constructed.

As with sentence #2 this is important information for understanding how a pipe wrench functions, but by itself it is not the main idea either.

In summary, the problem with sentence #1 is that it makes a statement which is not true. If it had said that there are many sizes of pipe wrenches it would have been true, but that statement is too broad, it makes it sound as though the paragraph is going to be about all the different sizes.

Sentences 2, 3, and 4 are all factual. Each one of them contains some important information about pipe wrenches, but each fact by itself is too narrow to be considered to be the main idea.

Look back at the paragraph and then think about how you would write the main idea down on paper. Then turn to the next page and see if you have the right information included.

The pipe wrench, or stillson wrench as it is sometimes called, comes in many sizes and is designed to grip and release pipes and other cylindrical surfaces depending upon the pressure applied to it's handle.

Did your main idea sound something like this one? It won't necessarily look exactly the same, but it should have included the facts which are in the sentence written above.

HACKSAWS

Hacksaws are used for cutting metals too heavy to cut with tin snips. Various types of stock and metals can be cut with the hacksaw since there are a number of different kinds of blades that can be attached to the frame. The number of teeth per inch is stated as the pitch of the blade. For example, an 18 pitch blade has 18 teeth per inch. Fine pitch blades, such as 32 pitch are used for cutting thin stock and tubing.

EXERCISE

1. What are the uses of the hacksaw?

2. What is meant by the pitch of the blade?

3. What kinds of materials would you cut with a fine pitch blade?

1. What are the uses of the hacksaw?

   Hacksaws are used for cutting stock and metals which are too heavy to cut with tin snips.

2. What is meant by the pitch of the blade?

   The pitch of the blade means the number of teeth per inch.

3. What kinds of materials would you cut with a fine pitch blade?

   You would cut thin stock and tubing with a fine pitch blade.

These questions can be very useful in helping you understand the main idea of the paragraph. They also are useful in giving you a general understanding of what you have read.

When you are reading factual information, such as you find in electronics manual, you should constantly be asking yourself such questions as:

1. Who or what is this paragraph about?
2. What does the author want me to understand about this subject.
3. What facts are included in this selection which make it clearer and easier to understand?

With those questions in mind look back at the paragraph on the last page and then in the space below write the main idea in your own words.

Tubing and metals too heavy to cut with tin snips may be cut with hack saws, whose blades vary according to the number of teeth per inch.

That pretty well says it. Of course it can be worded differently, and there's nothing wrong with this:

By selecting the proper hack saw blade, which have different numbers of teeth per inch, it is possible to cut tubing and metals which are too heavy to cut with tin snips.

Did your main idea sentence look like either of the two above? If not, what was the problem? Did you include too many details? If, for example, you said that an 18 pitch blade has 18 teeth per inch you have made the mistake of using a detail for a main idea. On the other hand if you said that hacksaws are used for cutting metals you have made too broad a statement. It is a true statement, understand that. However the paragraph does not talk about cutting all kinds of metals. Thus you can't simply say that this paragraph is all about hacksaws and cutting metals, because it doesn't begin to cover all of that territory.

An atom is made up of a nucleus surrounded by revolving electrons. The nucleus is made up of neutrons and protons. The charge of the electron is called negative and the charge of the proton is called positive, and is exactly equal to the negative charge of the electron. The neutron is made up of a proton and an electron, therefore, the neutron has no charge or is neutral. The structure of the atom is similar to the structure of our solar system, where the planets revolve around the sun.

EXERCISE

Do you remember the questions you should ask yourself when you are reading new material?

1. Who or what is this paragraph about?
2. What does the author want me to understand about th is subject?
3. What facts are included in this selection which make it clearer and easier to understand?

Let's apply these questions to the paragraph above and see what we learn from them. Remember, it is perfectly alright to look back at these paragraphs again and again when you are studying. There probably isn't a student in this class who could read through a paragraph like the one above and completely understand it without looking back.

1. Who or what is this paragraph about?

   Key 'things' mentioned would include atoms, nucleus, neutrons, protons, and electrons.

2. What does the author want me to understand about this subject?

   I'd guess that the author wants me to understand what an atom is all about.

3. What facts are included in this selection which make it clearer and easier to understand?

   The nucleus is surrounded by revolving electrons, in the nucleus you find neutrons and protons,

there are charges in the electron and proton but the neutron doesn't have any charge, and one way to imagine an atom is to think of the way in which planets revolve around the sun.

OK, having done all that you still haven't come up with a main idea statement for the selection. How about looking at both of these pages and then trying to write your own main idea in the space below. When you think you have it turn to the next page.

This is getting tough!!! However it is not impossible, and as a matter of fact if you really practice asking yourself these questions while you are reading you will find that it gets easier and easier. Does your main idea look anything like the one below?

> The structure of an atom is very similar to our solar system, except that in an atom there are small negatively charged particles called electrons, which revolve around a 'sun' called the nucleus which is made of positively charged particles called protons, and neutrons, which have no charge because they are made of both a proton and an electron, and are therefor neutral.

Did your main idea look something like the one above? If it did, pat yourself on the back because this is fairly difficult reading material. If not, don't give up, because you're going to be doing a lot of practicing in reading and identifying main ideas and important details.

ELECTROSTATIC CHARGE

The charge on a material caused by friction is called an electrostatic charge. A force field, called an electrostatic field, exists around a body that has an electrostatic charge. This force field causes a charged body to attract a neutral body or a body with an opposite charge. For example, a negatively charged body will attract a positively charged body. Bodies with like charges repel. We say that unlike charges attract and like charges repel.

EXERCISE

Read the statements below and write down why they are not good main idea statements for this paragraph.

1. Bodies with an electrostatic charge have a force field around them

2. Like charges repel and unlike charges attract.

3. The charge on a material caused by friction is called an electrostatic charge.

1. Bodies with an electrostatic charge have a force field around them.

   It's true, but there's more in the paragraph than just this. It's too narrow to be the main idea.

2. Like charges repel and unlike charges attract.

   This is true also, and it probably is Pretty important to the understanding of this paragraph, since the idea of bodies being attracted or repelled is repeated four times in the paragraph. However there's more information in this paragraph which you have to understand, so this is too narrow also.

3. The charge on a material caused by friction is called an electrostatic charge.

   Again a true statement, but not enough information to be considered the main idea.

OK then, to put the main idea into your own words you need to combine some of the facts from this paragraph.

1. An electrostatic field, or force field, exists around a body in which friction has caused a charge.

2. This force field causes a charged body to attract a neutral body or one with an opposite charge.

In the space below write a main idea statement which contains the most information in the two sentences above:

Does your main idea look something like this one?

When friction causes an electrostatic field to form around a body the charges in the body will attract other bodies which are either neutral or of the opposite charge.

VOLTS

The volt is the unit that measures the potential difference in electrical force or 'pressure' between two points on a circuit. The current at most receptacles and lights is at a pressure of 120 volts, although it may vary from 114 to 126. As the current moves from the hot supply wire through the load presented by an appliance or light, it loses voltage in doing work. When the current leaves the load and enters the return circuit provided by the neutral wire, it has lost all voltage and is at zero pressure, the same as the earth.

EXERCISE

In your own words first write down all of the important facts in this paragraph, then put them together into a main idea sentence:

1. The volt is...

2. Electrical current is at a pressure of...

3. Once the current leaves the load it...

My main idea statement:

1. ...the unit which measures the difference in electrical force or pressure between two points on a circuit.

2. ...120 volts, although it may vary from 114 to 126.

3. ...enters the return circuit provided by the neutral wire, at which time it has lost all voltage.

Main idea:

Voltage is a unit of measure relating to the potential difference in electrical pressure or force on an electrical circuit in which the most common voltage is 120 at a receptacle, with possible variation from 114 to 126, and zero voltage when the current leaves the load.

STATIC ELECTRICITY

When two bodies with opposite charges are separated by an insulator, the excess electrons pile up on the insulator at the negative charge. There is a stress across such an insulator called an electrical stress. If the value of either or both charges is increased, the stress may become too great. The electrons will rush across to the positive charge in an arc or spark. This spark causes light and a sharp noise. Lightning is an example of a spark.

EXERCISE

What specific information in this paragraph is necessary in order to understand the main idea?

1. Two bodies with opposite charges which are separated by an insulator sometimes develop an _____ _____ which is caused by _____ _____.

2. If the value of either or both of these charges is increased _____ _____.

3. When that happens the _____ _____ will rush _____.

All of the correct information to fit into those blanks is contained in the paragraph. Read it through carefully, and after you have finished these three sentences write the main idea below in your own words:

Your main idea should look something like this:

> When two bodies with opposite charges are separated by an insulator an electrical stress is formed on the insulator at the negative charge which can be upset if the value of either or both of the charges is increased at which point the electrons will rush across to the positive charge in an arc or spark.

That's an awful lot of information, but it is a brief statement containing information which is what the paragraph is mainly about.

STATIC ELECTRICITY

As an airplane flies through particles of dust, sleet, snow or rain, it often collects electrical charges from the particles as they strike the metal fuselage. The sum of all the small charges that are collected is added, and the airplane may be charged to a potential of several hundred thousand volts. This intense charge will gradually escape in the form of a glow discharge, called St. Elmo's fire. This type of discharge produces radio interference and may also cause a fire if gasoline vapor happens to be leaking out. To prevent this problem, a special discharging device is generally used on an airplane. One type of discharge device called a 'cat's tail' consists of a five-foot bundle of extremely fine wires with sharp points. This arrangement produces a smooth discharge at comparatively low voltage.

EXERCISE

Which of the following statements gives the main idea for this selection?

a. The type of glow discharge called St. Elmo's fire may cause an aircraft fire if gasoline vapor is leaking out when it is present.

b. Electrical charges can be collected from particles of dust, sleet, snow or rain as an airplane flies through them.

c. In order to prevent sudden electrical discharges some airplanes use an antenna called a 'cat's tail'.

If you chose A as the main idea turn to page 5.

If you chose B as the main idea turn to page 6.

If you chose C as the main idea turn to page 7.

A - No, if you chose this as the main idea of the selection you have selected an answer which is too narrow or limited. Your answer is a true statement, but there is more contained in the reading selection than just the fact that St. Elmo's fire can ignite gasoline fumes.

Reread the selection again, perhaps more slowly, and then see if you recognize the main idea from either B or C.

B - Yes, this is the main idea of the passage. The other sentences in the passage add detail to the main idea by giving you the name of this electrical charge and some of the hazards and by-products caused by St. Elmos'f fire. Please notice that although you have correctly identified the main idea you do not know all there is to be learned about the subject, and even though you may have little difficulty in identifying main ideas you must also be able to see how the details fit together in order to really master the subject.

C - No, if you chose this as the main idea of the selection you have make the mistake of identifying a detail which is interesting but too narrow to be the main idea. There is more in this selection than just the fact that a 'cat's tail' antenna is used on some airplanes to provide an outlet for this electrical build-up.

Reread the selection again, perhaps more slowly, and then see if you recognize the main idea from either A or B.

Resistance means oppostion to current flow. To understand this, consider that when an electric current flows in a wire, electrons are passed along from one atom to the next. Each atom in this conductor has an outer electron that is easily detached, and which moves along the wire when a voltage is applied. These electrons make up an electric current and are called free electrons. However, we must not think that an electron is entirely free to move, since it takes a certain amount of work to move an electron along a wire. This is just another way of saying that metals have an opposition or resistance to current flow. Resistance is measured in ohms, or ohm units. We define an ohm as the resistance that is present when a voltage of one volt causes a current of one ampere to flow.

EXERCISE

Which of the following statements gives the main idea for this selection?

a. Free electrons, which are the outer electron in an atom, are passed from one atom to the next, resulting in the flow of electrical current.

b. The flow of electrical current through a wire is hampered by resistance.

c. Electrical current flows easily through most metallic wire.

If you chose A as the main idea turn to page 9.

If you chose B as the main idea turn to page 10.

If you chose C as the main idea turn to page 11.

A - If you selected this as the main idea statement you are being too specific. There is more to this paragraph than just information about free electrons, so this statement is too limited to be the main idea.
Reread the selection on page 8 and then see if you can determine whether B or C is the best choice for the main idea.

B - Yes, this is the main idea of the selection. If you take this statement and then list beneath it all of the details or facts which are included in the rest of the selection you would have a definition and understanding of free electrons and how they move, a knowledge of what resistance is in electrical terms, and how to define and use the term ohm.

B - No, if you selected this as the main idea statement you are being too general. Think carefully about this paragraph and you will realize that there is much more specific information than simply how electrical current can flow through most metals.

Reread this paragraph and see if you can determine whether A or B is the best main idea statement.

Another important subject in electrical circuits is power. Power is the time rate of doing work. We often measure power in terms of foot-pounds per second. For example, if we take one second to lift a one pound weight 3 feet above it's resting position, the power that we have used is three foot-pounds per second. Or, suppose that we take three seconds to lift a one-pound weight 3 feet above it's resting psoition; the power that we have expended is one foot-pound per second. The horsepower is a unit of work that is often used to describe the rate at which an electric motor can do work. For example, a washing machine motor is usually a one-fourth horsepower motor. One horsepower is equal to moving a one pound weight 550 feet in one second.

EXERCISE

Which of the following statements gives the main idea for this selection?

A. The amount of time it takes to move a one pound weight one foot from it's resting position is called a foot pound.

B. The concept of power is very important in understanding electrical energy.

C. Two common terms used to express power are horsepower and foot pounds.

If you chose A as the main idea turn to page 13.

If you chose B as the main idea turn to page 14.

If you chose C as the main idea turn to page 15.

A - The concept of foot pounds is very important when dealing with the topic of power. However this is too specific to be the main idea. The paragraph also discussed 'horsepower,' so that should be included in the main idea statement. Reread the passage and see if you can determine whether B or C is the main idea statement.

B - No, this statement is far too general and vague to be the main idea. The article does deal with the concept of power, but in two specific terms, horespower and foot-pounds.

Reread the passage and see whether you can determine statement A or C is the correct main idea.

C - Yes, this is the main idea for this passage. The remaining sentences in the passage tell how to measure foot-pounds and horsepower.

An important fact to remember is that current rather than voltage determines shock intensity. Of course there must be voltage to cause current flow, but it is the way in which the current is resisted that determines the effect. The overall resistance properties of the human body as well as the point of resistance can vary from a few hundred ohms to many thousand ohms. If the skin is dry, it presents a high contact resistance of several hundred thousand ohms to a voltage so that only a small current flows through the body. However, if the skin is damp or wet the contact resistance can be less than 1000 ohms. In that case, even a low voltage can be fatal since a large current can pass through the body. In other words, a lower resistance allows a stronger current. The actual body contact resistance depends also upon the area of contact to a large degree.

EXERCISE

Read each of the four statements below and determine whether each is too general, too specific, irrelevant, or the main idea.

The overall resistance properties of the human body may vary greatly.

1. Too General
2. Too specific
3. Main idea
4. Irrelevant

Shock intensity is determined by resistance to electrical current

1. Too general
2. Too specific
3. Main idea
4. Irrelevant

If the skin is damp or wet the contact resistance can be less than 1000 ohms.

1. Too general
2. Too specific
3. Main idea
4. Irrelevant

Grounded electrical circuits use three-pronged plugs.

1. Too general
2. Too specific
3. Main idea
4. Irrelevant

The overall resistance properties of the human body may vary greatly.

This is much too general to be the main idea of this selection. It is a true statement, but the selection really doesn't focus on this very general topic.

Shock intensity is determined by resistance to electrical current.

Yes, this is the main idea. Note how the selection goes into some detail as to how resistance can be changed from wet to dry skin conditions and how this varies the intensity of the electrical shock.

If the skin is damp or wet the contact resistance can be less than 1000 ohms.

This is an important fact, but it is only one of a number of facts contained in the reading selection, and it is too specific to be the main idea.

Grounded electrical circuits use three-pronged plugs.

This is irrelevant to the paragraph. It is not mentioned at all, and though it may be a true statment it does not directly relate to anything in the selection.

Using a soldering iron properly is one of the most demanding skills of an electronics assembler. The soldering iron, like other tools, has to be selected to fit the job. It also requires careful handling from a safety point of view as it can cause severe burns. Furthermore, incorrect use of a soldering iron can cause a faulty soldering operation. A unit may be inoperative because a proper-appearing solder joint is in fact a poor one.

EXERCISE

Read each of the four statements below and determine whether each is too general, too specific, irrelevant, or the main idea.

Electronics assemblers must learn to use soldering irons carefully.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

An electronic calculator may have several dozen solder joints.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Specific types of soldering joints require special soldering irons.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Electronics assembly requires a knowledge of a variety of soldering techniques which vary both in the soldering process and type of iron used.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Electronics assemblers must learn to use soldering irons carefully.

This is an important fact and is almost good enough to be the main idea. However, the article goes into some detail about various soldering techniques and soldering guns, and therefore this answer is too specific to be the main idea.

An electronic calculator may have several dozen solder joints.

This is irrelevant, since this fact is not mentioned in the article.

Specific types of soldering joints require special soldering irons.

Again as with the first statement this is true and important, but it is simply too specific to be the main idea.

Electronics assembly requires a knowledge of a variety of soldering techniques which vary both in the soldering process and type of iron used.

This is the main idea. Note that it is a combination of ideas from several of the sentences in the selection and that the wording is not exactly the same as you find there.

Washers are round, flat disks with center holes that come in a number of variations to meet specific needs. They may be made of either metal or nonmetallic material as the need dictates. There are three basic categories of washers: (1) The flat washer protects the surface from the turning nut or screw. (2) The spring lock washer protects the surface also, but remains under spring tension when tightened. This keeps the nut from vibrating loose. (3) The external and internal teeth binding lock washers are used when a metal to metal contact is necessary. The teeth cut through a painted or varnished surface.

EXERCISE

Washers are divided into three basic categories.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Some washers are made of nonmetallic material.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Washers are round, flat disks with center holes.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Not all nut and bolt assemblies require washers.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Washers are divided into three basic categories.

This is the main idea. It's a very simple one which needs to be filled out with some details, such as what the three types are called and what their characteristics are. However all by itself it stands as the main idea. Please read through the rest of the exercises to see why they are not good main idea statements.

Some washers are made of nonmetallic material.

By this time you probably are picking up on the fact that a statement which only touches on one aspect or detail of the selection cannot be the main idea. It is an important fact, but not the most important bit of information within the article.

Washers are round, flat disks with center holes.

This is a definition of what washers are like. However it is a very general statement, because as you read the selection you find that there are other facts about them which are more important. Thus this statement is simply too general to be considered the main idea.

Not all nut and bolt assemblies require washers.

This information is not included in the selection, so it must be considered as irrelevant.

Making readable drawings and the reading of schematics, diagrams, and blueprints is a requirement for advanced assembler work. Several forms of respresentational drawing are used in electronics fabrication and assembly procedures. The simplest type of drawing is a pictorial drawing or diagram, also called a layout diagram, which shows how component parts are assembled in a chassis. Various components and terminals may be iden tified on the drawing by letters or numbers for conventient reference. Pictorial drawings are commonly done in perspective, although plan and side views may be used in situations where no confusion will result. Pictorial drawings are often presented as exploded illustrations which show the order in which parts are assembled and their correct relations, when this method will clarify assembly procedures.

EXERCISE

Pictorial drawings help assemblers see how various parts fit together.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Advanced electronic assemblers must know how to make drawings.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Of the various types of drawings which an advanced electronics assembler is expected to be able to make the simplest type is a layout diagram.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Blueprints, schematics, and diagrams are used in many industries.

1. Too specific
2. Too general
3. Main idea
4. Irrelevant

Pictorial drawings help assemblers see how various parts fit together.

This is an awfully vague statement. There is nothing here which ties the statement to the electronics industry nor do we get any idea that there are certain specific types of drawings which are used for this purpose. This is far too general to be considered a main idea statement.

Advanced electronic assemblers must know how to make drawings.

This is simply too general to be considered the main idea.

Of the various types of drawings which an advanced electronics assembler is expected to be able to make the simplest type is a layout diagram.

This is an excellent main idea statement. Note, however, that because it is the longest answer it isn't correct. The correctness is due to the fact that all of the rest of the article provides additional information as to the type of drawings which an advanced electronics assemble is expected to be able to make, with particular emphasis on the layout diagram.

Blueprints, schematics, and diagrams are used in many industries.

There's nothing wrong with this statement, as it happens to be true. However the article you just read didn't m ention the use of blueprints, schematics and diagrams in many industries, and therefore this is irrelevant.

Let's stop and examine what we've been doing. A main idea is what a paragraph or selection is 'mainly' about. In simple terms it tells who or what something is all about. It is important for you to be able to identify main ideas because if you can't when you read an assignment the only thing you'll remember will be a series of 'facts' which don't really mean much to you. Many students have this problem; they read through an assignment and when they finish they can remember a few names or dates but don't know who the people are or what the dates stand for.

In order to really understand your reading, whether it be in electronics, history, or even the newspaper, you must actively work at developing your ability to identify the who or what the selection is all about. As an example, if you have been working in the first unit of the electronics handout which is entitled SAFETY you would not be correct if you said that it was "All about safety". The reason that this is not satisfactory as a main idea statement is that this particular unit deals with a specific kind of safety, and that is limited to working with electrical equipment. This chapter does not deal with water safety, highway safety, or any other kind of safety procedures. So a common type of error would be made if you said that the chapter deals only with the topic "Safety". That is far too broad, and as was pointed out it does not include all kinds of safety as listed above. On the other hand if you said that the chapter dealt with the dangers of electrical shock when standing on a wet or damp floor you would have made the mistake of making your main idea statement too narrow or specific. There is information in this chapter dealing with this danger, but the chapter also containes information about other conditions and so if you had said that electrical shock when standing on the damp floor was the main idea you would have mistaken a single detail or fact for the main idea.

Up to this point you have been asked to select a main idea statement after reading a paragraph. In the next exercises

you will be asked to write the main idea in your own words. On the page following each paragraph will be some suggestions as to what facts should be included in the main idea statement as well as which facts belong with the details.

Another type of primary cell that supplies more current than a dry cell is the alkaline-manganese cell - often called an alkaline cell or battery. The alkaline cell, which is used in portable radios, tape recorders, shavers, and electric toys, has an appearance that is the same as that of a flashlight cell. The alkaline cell has an emf of approximately 1.2 volts. Although a single cell is popularly termed a battery, we find that by strict definition a battery consists of two or more cells connected together.

EXERCISE

Write the main idea of this selection in your own words in the space below:

There are a number of facts in this passage, some of which are important to an understanding of the main idea and others which are details:

Main idea facts

1. An alkaline-manganese cell is often called an alkaline cell or battery.
2. An alkaline cell supplies more current than a dry cell.
3. An alkaline cell has an appearance that is the same as that of a flashlight cell.

Detail facts

1. The alkaline cell is used in portable radios, tape recorders, shavers, and electric toys.
2. The alkaline cell has an emf of approximately 1.2 volts.
3. A single cell is popularly termed a battery, though by strict definition a battery consists of two or more cells connected together.

Bear in mind the fact that your main idea statement does not have to be exactly the same as the one below. It should, however, contain the same facts and perhaps read something like:

Although it looks like a flashlight battery an alkaline-manganese cell or battery, sometimes just called an alkaline cell, supplies more current than a dry cell.

How did you do on this one? Try the one on the next page and see if you find it easier.

There are a number of facts in this passage, some of which are important to an understanding of the main idea and others which are details:

Main idea facts

1. An alkaline-manganese cell is often called an alkaline cell or battery.
2. An alkaline cell supplies more current than a dry cell.
3. An alkaline cell has an appearance that is the same as that of a flashlight cell.

Detail facts

1. The alkaline cell is used in portable radios, tape recorders, shavers, and electric toys.
2. The alkaline cell has an emf of approximately 1.2 volts.
3. A single cell is popularly termed a battery, though by strict definition a battery consists of two or more cells connected together.

Bear in mind the fact that your main idea statement does not have to be exactly the same as the one below. It should, however, contain the same facts and perhaps read something like:

Although it looks like a flashlight battery an alkaline-manganese cell or battery, sometimes just called an alkaline cell, supplies more current than a dry cell.

How did you do on this one? Try the one on the next page and see if you find it easier.

From a very broad viewpoint, the job opportunities in electronics technology can be divided into the federal government market, the industrial electronics market, and the consumer market. It may be noted that the Department of Defense is the largest purchases of electronics equipment. The industrial electronics market is second in dollar volume, followed by the consumer market. It is helpful to note that the consumer market is the most stable field of employment and that the federal government market is the least stable from the viewpoint of job security. That is, activity in the Department of Defense is marked by rapid rise-and-fall periods in accordance with changing military requirements.

EXERCISE

Write the main idea of this selection in your own words in the space below:

Main idea facts

1. Job opportunities in electronics technology may be divided into three basic fields; the federal government, industrial electronics, and consumer electronics.

2. The most stable electronics employment is in the consumer field.

3. The least stable electronics jobs are in the federal government.

Detail facts

1. The Department of Defense is the largest purchaser of electronics equipment.

2. The industrial electronics market is second in dollar volume.

3. The smallest electronics market is the consumer field.

4. Department of Defense activity is marked by rapid rise-and-fall periods in accordance with changing military requirements.

Your main idea statement may not be the same as the one below, but it should contain the same facts:

Broadly speaking job opportunities in electronic technology may be divided into three fields; the federal government, which is the largest but least stable job-wise, industrial electronics, and the smallest but most stable field for employment, consumer electronics.

Factories, shops, business houses, and residences make very wide use of AC and DC motors. We find a DC starter motor in every automobile. Refrigerators and washing machines are operated by AC motors, and electric clocks are operated by a special type of AC motor that runs at an exact speed. The motor principle is used in many devices that might not be thought of as motors; for example, the watt hour meters that are installed in almost all buildings are a form of AC motor. All voltmeters and ammeters operate on the motor principle. We find that the loudspeakers used in radio, television, and high-fidelity receivers also operate on the motor principle. It is important, therefore, for every technician to have a good understanding of motor action.

EXERCISE

Write the main idea of this selection in your own words in the space below:

Main idea facts

1. AC and DC motors are used in many places.
2. The motor principle is used in some devices which may not be thought of as motors.
3. It is important for an electronics technician to have a good understanding of motor action.

Detail facts

1. Automobile starter motors operate on the DC principle.
2. AC motors are found in refrigerators, washing machines, electric clocks, and watt hour meters.
3. The motor principles is also used in such things as voltmeters, ammeters, loudspeakers and hi-fi receivers.

Does your main idea statement look something like the one below?

Because AC and DC motors and the motor principle is used in many places it is important for an electronics technician to have a good understanding of motor action.

Although less research and development is found in industrial electronics organizations than in defense plants, this is nevertheless an important occupational area for technicians. Industrial electronics work includes computers, process-control and operating equipment for factories or commercial installations, test and measuring equipment, medical electronic devices and systems, products for nuclear analysis and instrumentation, office dictating equipment, closed-circuit television units, and many related devices and systems. Approximately one half of the electronics technicians employed by industry are assigned to process-control activities. Automation is the most important part of this branch of industrial electronics.

EXERCISE

Write the main idea of this selection in your own words in the space below:

Main idea facts

1. There is less research and development in electronics organizations than in defense plants, although it is an important occupational area for technicians.

2. Approximately one half of the electronics technicians employed by industry are assigned to process-control activities.

3. Automation is the most important part of this branch of industrial electronics.

Detail facts

1. Industrial electronics work includes computers, process-control and operating equipment for factories or commercial installations, test and measuring equipment, medical electronic devices and systems, products for nuclear analysis and instrumentation, office dictating equipment, closed-circuit television units, and many related devices and systems.

How does your main idea compare to the one below?

In the field of industrial electronics automation is the most important branch, and approximately one half of the electronics technicians are assigned to process-control activities, while research and development is less important here than it is in defense plants.

PC BOARDS

After a printed-circuit board, or PC board, has been formed, the components are added, and the connections are all made at the same time by dipping the underside of the PC board into molten solder or by hand soldering. Since the components are often mounted on the board by automatic machinery, the cost of manufacture is much less than with ordinary copper-wire connections. Also, the amount of space necessary for a given number of components is considerably less because less space is required for connecting wires and terminals.

EXERCISE

Write the main idea of this selection in your own words in the space below:

THERMOCOUPLES

Thermocouples are used to change heat into electricity. The operation of a basic arrangement is explained in terms of the rates at which electrons diffuse from one kind of metal into another kind of metal. When the metals bismuth and antimony are brought into contact, electrons diffuse faster from the bismuth into the antimony than from the antimony into the bismuth. This produces a small potential difference across the junction between the metals. If a complete path for electron flow is provided, and one junction is heated, electric current flows because the hot junction generates a higher voltage than the cold junction.

EXERCISE

In the space below write the main idea in your own words:

MOTORS

A motor has the function of changing electricity into motion. In most cases, an armature or rotor is turned on a shaft. The armature consists of an electromagnet mounted on a shaft. This armature can turn around between the poles of a permanent magnet called the field magnet. When the armature is in a position without a current through the winding, it does not turn. This is because it is attracted as much by the north pole as by the south pole of the field magnet. However, if we pass a current through the winding on the armature, the south pole of the armature will be attracted by the north pole of the field magnet, and the north pole of the armature will be attracted by the south pole of the field magnet. Therefore, the armature will turn one-quarter revolution. Notice that with current through the winding the armature will turn in a counterclockwise direqtion be